of extract, growth rate is less at 18° C and 30° C than at 25° C. At all temperatures there was a marked effect of the extract on the length of the coleoptile at relative concentrations of 25 and over. The effect of temperature and concentration of extract on the length of the primary root was usually similar to that for coleoptile length.

The osmotic pressure of the solution at a relative concentration of 100 was only 5.4 atm. as determined by the vapour pressure method. At 30° C, pressures of 5 atm. have been shown to have only a slight effect (about 10 per cent reduction) on the germination of subterranean clover seed (personal communication from R. M. Moore). There is no effect of such an osmotic pressure at lower temperatures. The reduction of about 75 per cent in germination of subterranean clover at 23° C and 30° C obtained in this work can be attributed therefore to an inhibitory effect of the extract.

The effect of the extract on both subterranean clover and wheat is maintained only if the seed remains in contact with the solution. The viability of seeds which had not germinated after three days was tested by washing thoroughly in distilled water, and germinating at a favourable temperature. The seeds from all treatments germinated readily, even after they had been soaked for three days at relative concentration 100 at 30° C. It was observed, however, that there was a residual effect of the extract on the growth rate of the radicle of subterranean clover, the effect increasing with increasing concentration.

The results show that seed of subterranean clover contains a water-soluble substance or substances which at high concentrations adversely affect germination and growth. This inhibitory effect is strongly dependent on temperature and seems to be non-specific.

A recent paper³ has been brought to my attention since this publication was prepared. The hypothesis of Taylor and Rossiter that a water-soluble inhibitor of germination is involved in the regulation of germination of new (dormant) seed is extended by the results of the present study. The magnitude of the inhibitory effect obtained in this study may vary with cultivar and seed-lot as suggested by Taylor and Rossiter.

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Taxonomic Significance of Carotenoids

GOODWIN¹, reviewing the distribution of carotenoids in non-photosynthetic tissue, came to the conclusion that it was very difficult to see their taxonomic significance. Rubixanthin seemed to be restricted to *Rosa* spp.² and it was suggested that, if a carotenoid mixture contained significant amounts of rubixanthin, then one could say with some confidence that the source of rubixanthin was the hips of a species of *Rosa*¹. Rubixanthin, however, has been identified in several other plants, namely, *Cuscuta salina*, *C. subinclusa*³ and *Gazania rigens*⁴. Valadon⁵ has also identified this pigment in the orange peel fungus, *Peziza (Aleuria) aurantia*, but Jensen⁶ failed to confirm this result and had found a new pigment. With a view to finding whether rubixanthin was restricted to some members of the higher plants, we have reinvestigated the carotenoid composition of the orange peel fungus.

A number of specimens of *Peziza aurantia* were extracted in methanol and the carotenoids were separated and identified by our usual procedures⁷. The following

Table 1. CAROTENOID COMPOSITION OF *Peziza (Aleuria) aurantia*

Carotenoids	Amount	
	(µg/g)	Per cent
α-Carotene	2.0	0.3
β-Carotene	300.5	43.9
Unknown (418, 443, 470)	4.3	0.6
γ-Carotene	106.4	15.5
Neurosporene	28.8	4.3
Rubixanthin	67.7	9.9
Aleurixanthin	146.9	21.5
Lycopene	11.8	1.7
3,4-Dehydrolycopene	5.6	0.8
Unknown (475, 486)	5.0	0.7
Unknown (416, 440, 467)	3.2	0.5
Unknown (435, 460, 487)	2.5	0.3
Total carotenoids	684.6	100

pigments were characterized: β-carotene, γ-carotene and aleurixanthin ester, lycopene and 3,4-dehydrolycopene, in agreement with Liaaen Jensen's findings⁶. Several other pigments, however, were identified: α-carotene, neurosporene and rubixanthin, which were not in Jensen's specimens. There were also four other carotenoids that could not be positively identified because they were found in too small an amount. One such pigment was strongly adsorbed on the MgO-'Celite' column, was found as the top band, had the same absorption spectrum as γ-carotene and might be aleurixanthin⁶. Rubixanthin was present and it was identified by its absorption spectrum and its position on an MgO-'Celite' column. It also did not separate from pure rubixanthin using circular chromatography. This was achieved with paper loaded on 22 per cent silica gel and eluted with 1 per cent acetone in *n*-hexane. The amounts of carotenoids separated from *Peziza aurantia* are shown in Table 1.

It is well known that plants from different geographical habitats and of different species differ with respect to their carotenoid composition^{1,7}. Fungi seem to be no exception. It has been shown that ultraviolet irradiation can alter the pigment composition in fungi⁸ and one may conclude that in different conditions of light and temperature it is possible to have changes in the quantities as well as in the qualities of the pigments involved. It is not unexpected therefore to find different pigment composition in the same species of fungi in different parts of the world. The evidence presented shows that carotenoids may not be useful as a taxonomic character.

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MICROBIOLOGY

Action of Bacteriophages obtained from *Corynebacterium diphtheriae* on *C. ulcerans* and *C. ovis*

THE value of phage-typing in studying the strains of bacteria responsible for certain infections raised the question of whether phage-typing might also be valuable in epidemiological studies of diphtheria. Early investigations on this subject have already been reported¹⁻⁶. Most of these earlier studies were restricted by the very